Discrete Applied Mathematics 43 (1993) 297–300
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Book Announcements

R.A. Vaughan, ed., Pattern Recognition and Image Processing in Physics (Adam Hilger, Bristol, 1991) 366 pages

Digital Image Processing (J.J. Gerbrands). *Image Processing and Image Processing Software* (M. Landy). *Free Software for Image Processing* (L. Hayes). *Automatic Pattern Recognition* (L.N. Kanal). *Feature Selection and Extraction in Pattern Recognition* (J. Kittler). *Shape Representation and Matching* (L.S. Davis). *Motion Analysis* (P. Thévenaz). *Multivariate Analysis Methods* (F. Murtagh). *Parallel Computers – Architectures and Programming* (C.R. Jesshope). ISPAHAN/IPACS – *An Interactive System for Pattern Analysis and Classification* (E.S. Gelsema). *Applications of Waveform and Image Pattern Recognition* (J.M. Durocher, D.R. Hay and R.W.Y. Chan). *Image Processing and Electron Microscopy of Biological Specimens* (R. Henderson). *Geometric Analysis of Video Microscopy Imaged DNA Molecules* (B.L. Tiernay, M.F. Maestre and W.E. Johnston). *Acquisition of Digital Images from Video Tape* (W.E. Johnstone, D. Robertson and B.L. Tiernay). *Ring Imaging Cerenkov Detectors for Particle Identification* (G. Hallewell). *Elementary Particle Track Finding and Neural Networks* (N. Gee). *Image Processing for Remote Sensing* (P. Mather). *A Fast Algorithm for the Automatic Recognition of Heat Sources* (L.W.B. Hayes). *The Application of Pattern Recognition to Geological and Soil Thin Sections* (A.I. Watson). *Image Processing in Astronomy* (P.N. Bhat). *Multiresolution Estimation of Grey Level Histograms* (R. Roman-Roldan). *Model-driven Edge Tracing* (A. Viewag and M.F. Carlsohn).

Bela Andrasfai, Graph Theory: Flows, Matrices (Adam Hilger, Bristol, 1991) 280 pages

Chapter 1: *Structure of the Graph Model.* The abstract graph. Geometrical realisation of graphs. Components. Leaves. Blocks. The strongly connected components of directed graphs. *Chapter* 2: *Optimal flows.* Two basic problems. Maximal set of independent paths. The optimal assignment problem. The Hungarian method. Max flow – min cut. Dynamic flow. The mobilisation problem. The synthesis of flow problems. Optimal planning. The role of the critical path. Minimal cost transportation. Minimal cost flows. *Chapter* 3: *Graphs and Matrices.* The adjacency matrix. The incidence matrix. The circuit matrix. Cutsets and the cutset matrix. Interrelations between the matrices of graphs. The spectrum of graphs. The complexity. Linear electrical networks. Further matrices associated with graphs.

Elsevier Science Publishers B.V.

U. Ramacher and R. Ruckert, eds., VLSI Design of Neural Networks (Kluwer Academic Publishers, Boston, 1991) 343 pages

Guide Lines to VLSI Design of Neural Nets (U. Ramacher). *(Junction) Charge-Coupled Device Technology for Artificial Neural Networks* (J. Hoekstra). *Analog Storage of Adjustable Synaptic Weights* (E. Vittoz, H. Oguey, M.A. Maher, O. Nys, E. Dijkstra and M. Chevroulet). *Precision of Computations in Analog Neural Networks* (M. Verleysen and P. Jespers). *Architectures for a Biology-Oriented Neuroemulator* (S.J. Prange and H. Klar). *Pulsed Silicon Neural Networks - Following the Biological Leader* (A.F. Murray, L. Tarassenko, H.M. Reekie, A. Hamilton, M. Brownlow, S. Churcher and D.J. Baxter). *ASICs for Prototyping of Pulse-Density Modulated Neural Networks* (P. Richert, L. Spaanenburg, M. Kespert, J. Nijhuis, M. Schwarz and A. Siggelkow). *VLSI Design of an Associative Memory Based on Distributed Storage of Information* (U. Rückert). *Silicon Integration of Learning Algorithms and other Auto-Adaptive Properties in a Digital Feedback Neural Network* (P.Y. Alla, G. Dreyfus, J.D. Gascuel, A. Johannet, L. Personnaz, J. Roman and M. Weinfeld). *Fast Design of Digital Dedicated Neuro Chips* (J. Quali, G. Saucier and J. Trilhe). *Digital Neural Network Architecture and Implementation* (J.A. Vlontzos and S.Y. Kung). *Toroidal Neural Network: Architecture and Processor Granularity Issues* (S. Jones, K. Sammut, Ch. Nielsen and J. Staunstrup). *Unified Description of Neural Algorithms for Time-Independent Pattern Recognition* (U. Ramacher and B. Schürmann). *Design of a 1st Generation Neurocomputer* (U. Ramacher, J. Beichter, W. Raab, J. Anlauf, N. Brüls, U. Hachmann and M. Wesseling). *From Hardware to Software: Designing a "Neurostation"* (P. Bessiere, A. Chams, A. Guerin, J. Herault, C. Jutten and J.C. Lawson).

Saul I. Gass, Linear Programming (McGraw-Hill Book Company, New York, 1985) 532 pages

PART 1: INTRODUCTION. *Chapter* 1: *General Discussion.* Linear-programming problems. Examples of linear-programming problems. *Chapter* 2: *Mathematical Background.* Matrices. Vectors and vector spaces. Convex sets. Linear inequalities. Solution of a set of linear equations. PART 2: METHODS: THEORETICAL AND COMPUTATIONAL. *Chapter* 3: *The General Linear-Programming Problem.* The linear-programming problem. Properties of a solution to the linear-programming problem. Generating extreme-point solutions. *Chapter* 4: *The Simplex Computational Procedure.* Development of a minimum feasible solution. Computational procedure. The artificial-basis technique. A first feasible solution using slack variables. Geometric interpretation of the simplex procedure. *Chapter* 5: *The Revised Simplex Method.* The general form of the inverse. The product form of the inverse. Computational considerations. *Chapter* 6: *The Duality Problems of Linear Programming.* The unsymmetric primal-dual problems. The symmetric primal-dual problems. Economic interpretation of the primal-dual problems. *Chapter* 7: *Degeneracy and Anticycling Procedures.* Perturbation techniques. The lowest-index anticycling rules. Example of cycling. *Chapter* 8: *Parametric Linear Programming and Sensitivity Analysis.* The parametric objective function. The parametric dual problem. Sensitivity analysis. Multiobjective linear programming. *Chapter* 9: *Additional Computational Techniques.* Determining a first feasible solution. The dual simplex method. Integer programming. The decomposition of large-scale systems. Bounded-variable problems. The simplex algorithm and computational efficiency. PART 3: APPLICATIONS. *Chapter* 10: *The Transportation Problem.* The general transportation problem. Computational procedure for solving the transportation problem. Variations of the transportation problem. *Chapter* 11: *General Linear-Programming Applications.* Production-scheduling and inventory-control problems. Interindustry problems. Diet problems. Network-flow problems. Sample of applications. Linear programming and the theory of games. PART 4: NONLINEAR PROGRAMMING. *Chapter* 12: *Nonlinear Programming.* The general problem of mathematical programming. Mathematical background. The convex-programming problem. Quadratic programming. Separable programming.

A. Mizrahi and M. Sullivan, Finite Mathematics with Applications for Business and Social Sciences (Wiley, New York, 1992) 687 pages

PART ONE: LINEAR ALGEBRA. *Chapter* 1: *Preliminaries.* Real numbers. Rectangular coordinates and straight lines. Parallel and intersecting lines. *Chapter* 2: *Matrices with Applications.* Review: systems of linear equations. Systems of linear equations and augmented matrices. Solving systems of m linear equations in n unknowns. Matrix algebra. Multiplication of matrices. Inverse of a matrix. *Chapter* 3: *Linear Programming Part One: Geometric Approach.* Introduction. Linear inequalities. A geometric approach to linear programming problems; model: pollution control. *Chapter* 4: *Linear Programming Part Two: The Simplex Method.* The simplex tableau. The simplex method: the maximum problem. The simplex method: the minimum problem. The simplex method with mixed constraints; Phase I/Phase II; model: pollution control. *Chapter* 5: *Finance.* Simple interest and simple discount. Compound interest. Annuity; sinking fund. Present value of an annuity; amortization. PART TWO: PROBABILITY. *Chapter* 6: *Sets; Counting Techniques.* Sets. Multiplication principle. Permutations. Combinations. More counting techniques. The binomial theorem. *Chapter* 7: *Introduction to Probability.* Introduction. Sample spaces and assignment of probabilities. Properties of the probability of an event. Probability for the case of equally likely events. Probability problems using counting techniques. *Chapter* 8: *Additional Topics in Probability.* Conditional probability. Independent events. Bayes' formula. Binomial probability model. Random variables. Expectation. Further applications. *Chapter* 9: *Statistics.* Introductory remarks. Organization of data. Other graphical techniques. Measures of central tendency. Measures of dispersion. Normal distribution. *Chapter* 10: *Applications to Games of Strategy.* Introduction. Mixed strategies. Optimal strategy in two-person zero-sum games with 2×2 matrices. Optimal strategy in other two-person zero-sum games using geometric methods; model: cultural anthropology. Solving nonstrictly determined matrix games using linear programming. *Chapter* 11: *Markov Chains.* An introduction to Markov chains. Regular Markov chains; model: social mobility. Absorbing Markov chains; model: the rise and fall of stock prices. An application to genetics. PART THREE: DISCRETE MATHEMATICS. *Chapter* 12: *Logic and Logic Circuits.* Propositions. Truth tables. Implications; the biconditional connective; tautologies. Arguments; model: life insurance. Logic circuits. *Chapter* 13: *Relations, Functions, and Induction.* Relations. Functions. Sequences. Mathematical induction. Recurrence relations. *Chapter* 14: *Graphs and Trees.* Graphs. Paths and connectedness. Eulerian and Hamiltonian circuits. Trees. Directed graphs.

T.H. Tse, A Unifying Framework for Structured Analysis and Design Models (Cambridge University Press, Cambridge, 1991) 179 pages

Chapter 1: *Introduction. Chapter* 2: *Desirable Features of Systems Development Environments.* Introduction. Abstraction of the real world (User familiarity of the specification language. Language style. Multi-level abstraction. Feedback to users. Modifiability). Manipulation of representations (Tools of manipulation. Transformation. Validation. Independence of design and implementation). Construction of a real system (Computability, Verification of implementation). *Chapter* 3: *A Comparison with Related Work.* Introduction. PSL/PSA and META/GA. ADS/SODA. SADT/EDDA. SAMM/SIGS. RSL/SREM. *Chapter* 4: *An Initial Algebra Framework for Unifying the Structured Models.* Introduction. Algebras. Initial algebras. Yourdon structure charts. DeMarco data flow diagrams. Jackson structure texts. *Chapter* 5: *A Functorial Framework for Unifying the Structured Models.* Introduction. A brief introduction to category theory. Category of De-Marco like processes (Objects. Morphisms). Category of De-Marco like tasks. Other categories of structured models. Functors and freeness. *Chapter* 6: *The Identification of Unstructuredness.* Introduction. Connected tasks and skeletons. Minimal subtasks. Defining unstructuredness (An entry in the middle of a selection or parallel connection. An exit in the middle of a selection or parallel connection. An entry in the middle of an iteration. Non-unique exit in an iteration). Identification of multiple iteration exits. Partially overlapping skeletons. *Chapter*

7: *A Prototype System to Implement the Unifying Framework*. Introduction. Example on an application of the system. System characteristics (Choice of development language. Components of the prototype system. Examples of algorithms).

Howard Karloff, Linear Programming (Birkhauser, Boston, 1991) 142 pages

Chapter 1: *The Basics*. Introduction. Computational model. Linear algebra and geometry. Basic solutions. *Chapter* 2: *The Simplex Algorithm*. Pivoting. Tableaux. Cycling. Getting started. Worst-case performance. *Chapter* 3: *Duality*. The dual. The duality theorem. Complementary slackness. Applications (Farkas' lemma. The economic interpretation of the dual. Game theory). *Chapter* 4: *The Ellipsoid Algorithm*. LP and related problems. Affine transformations and ellipsoids. Basic lemmas. The algorithm. *Chapter* 5: *Karmarkar's Algorithm*. Ideas. The algorithm. Analysis. Conversion to Karmarkar standard form.

D.H. Greene and D.E. Knuth, Mathematics for the Analysis of Algorithms (Birkhauser, Boston, 1990) 132 pages

Chapter 1: *Binomial Identities*. Summary of useful identities. Deriving the identities. Inverse relations. Operator calculus. Hypergeometric series. Identities with the harmonic numbers. *Chapter* 2: *Recurrence Relations*. Linear recurrence relations (Finite history (Constant coefficients. Variable coefficients). Full history (Differencing. By repertoire)). Nonlinear recurrence relations (Relations with maximum or minimum functions. Continued fractions and hidden linear recurrences. Doubly exponential sequences). *Chapter* 3: *Operator Methods*. The cookie monster. Coalesced hashing. Open addressing: uniform hashing. Open addressing: secondary clustering. *Chapter* 4: *Asymptotic Analysis*. Basic concepts (Notation. Bootstrapping. Dissecting. Limits of limits. Summary of useful asymptotic expansions. An example from factorization theory). Stieltjes integration and asymptotics (O-notation and integrals. Euler's summation formula. An example from number theory). Asymptotics from generating functions (Darboux's method. Residue calculus. The saddle point method).